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REPORT OF SAMPLING ACTIVITIES

AT

RICO-ARGENTINE MINE

RICO, COLORADO

TDD R8-8411-02

EPA PROJECT OFFICER: THOMAS STAIBLE

E&E PROJECT OFFICER: MARGARET BABITS

SUBMITTED TO: KEITH SCHWAB - FIT RPO

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HAZARDOUS
SITE CONTROL
DIVISION

**Remedial
Planning/
Field
Investigation
Team
(REM/FIT)**

ZONE II

CONTRACT NO.
68-01-6692

CH₂M HILL
Ecology &
Environment

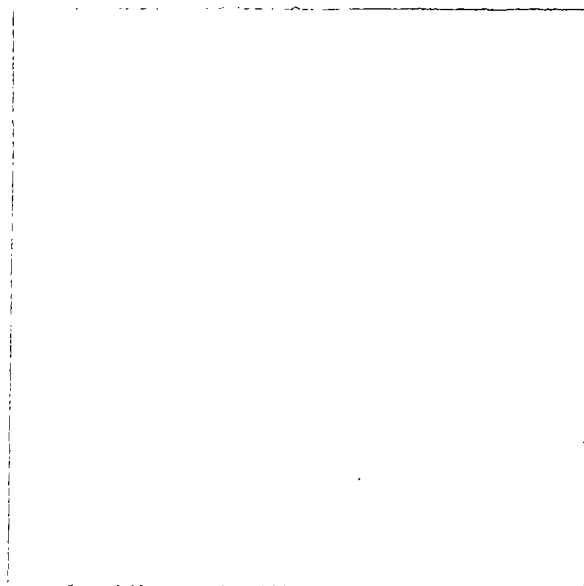


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SAMPLING ACTIVITIES AT
RICO-ARGENTINE MINE
RICO, COLORADO
TDD #R8-8411-02

I. INTRODUCTION

This report has been prepared to satisfy the requirements of Technical Directive Document (TDD) R8-8411-02 issued to the Ecology and Environment, Inc., Field Investigation Team (E&E FIT) by the Region VIII U.S. Environmental Protection Agency (EPA).

The field investigation was conducted on November 14, 1984. E&E FIT members conducting this investigation were Ben Genes, Tim Goering, and Meg Babits, who served as project officer. Site access was coordinated by Meg Babits through Mr. Robert Dent of Anaconda Minerals Company. Mr. Orville Janke, caretaker of the Rico-Argentine Mine, met with E&E FIT members and received splits of all the surface water samples and one sediment sample.

Sampling procedures used throughout this study were in accordance with the June 1982 Standard Operating Procedures for Field Samplers published by the Environmental Services Division (ESD), and the ESD approved Sampling Plan for this project, TDD #R8-8408-17.

The overall scope of this project involved the collection of nine surface water samples and eight sediment samples. A blank water sample was also prepared. Surface water samples were submitted for determination of cyanides, sulfates and Task 1 and 2 metals including both total and dissolved analysis. Sediment samples were submitted for determination of Task 1 and 2 metals.

All surface water samples were hand delivered to Rocky Mountain Analytical Laboratory in Arvada, Colorado. All sediment samples were shipped via Federal Express to Radian Corporation in Austin, Texas.

All samples were received by the laboratories intact and under proper chain-of-custody procedures.

II. SITE DESCRIPTION

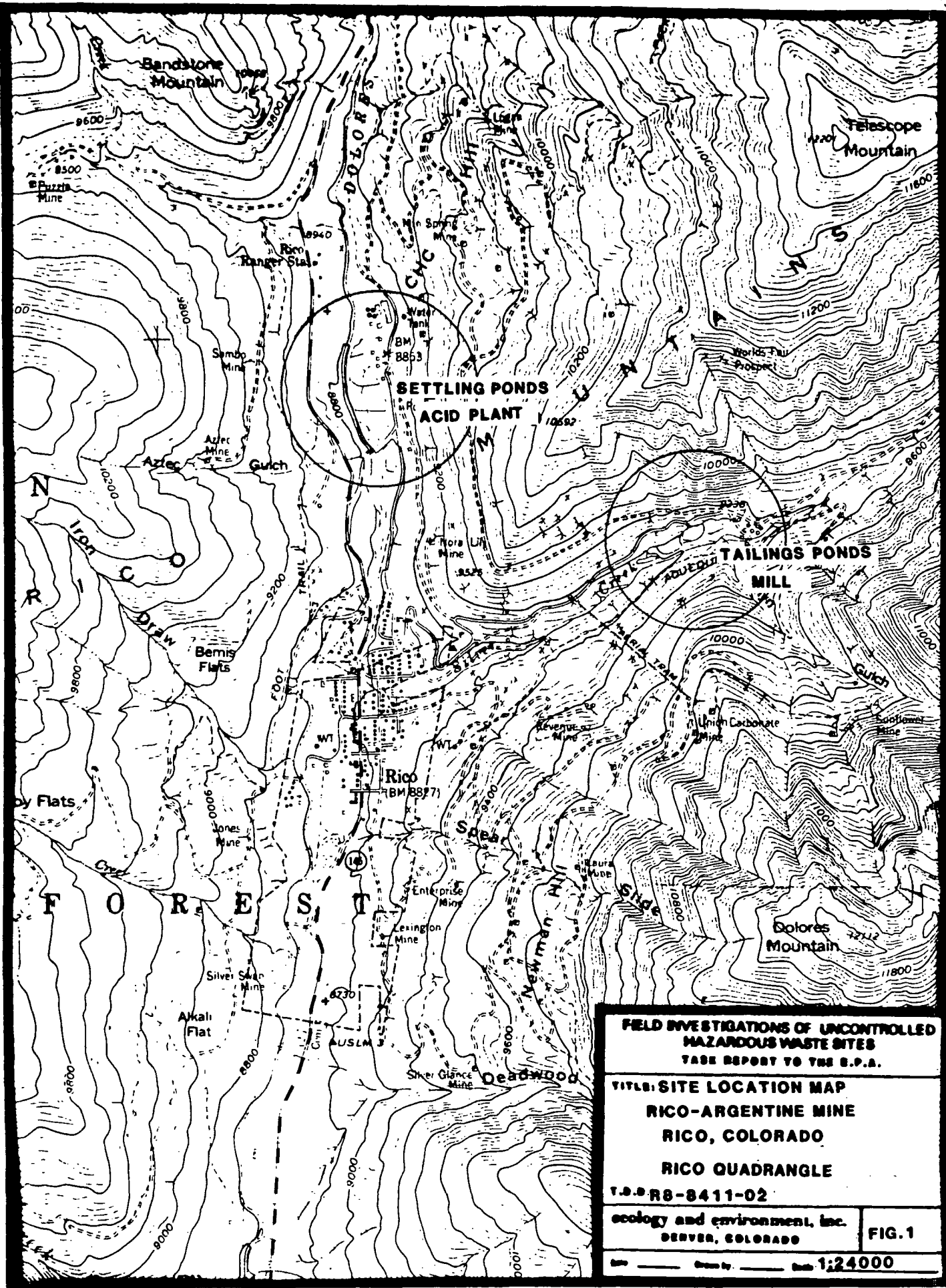
The Rico-Argentine Mine is located north of Rico, Colorado in portions of Sections 24 and 25, Township 40 North, and Range 11 West. The general site location is shown in Figure 1.

The Rico-Argentine Mine is an inactive operation owned by the Anaconda Minerals Company. Initially, the chief metal produced in the Rico District was silver. There was a switch to pyrite for sulfuric acid production during the 1954 uranium boom and a sulfuric acid plant was built. More recently, lead and zinc have been the most valuable metals. Operations consisted of a mill and tailings ponds on Silver Creek and an acid plant, cyanide heap leach, and settling ponds on the Dolores River. There were two discharge points associated with the operation. Discharge point 001 was the discharge from the Blaine Tunnel on Silver Creek. There is no longer discharge from 001 because it is redirected underground to the St. Louis Tunnel where it drains into the St. Louis Settling Pond System on the Dolores River. The outfall of the final pond into the Dolores River is discharge point 002.

In April of 1984, Anaconda Minerals Company put into effect a water treatment operation at the St. Louis Tunnel. The operation consists of neutralization using slaked lime.

The city of Rico has its drinking water supply on Silver Creek above the major mining impacts. The water is treated through infiltration galleries and chlorinated.

A geotechnical investigation was conducted by Dames and Moore in 1981 to evaluate the need for stabilization and the potential for expansion of the tailings ponds on Silver Creek. When discussing hydrological conditions, Dames and Moore suggest that the seepage detected



downstream from the third tailings pond on Silver Creek is predominantly down valley flow and not seepage from the tailings ponds. The banks of Silver Creek which are directly below the tailings pond berms have since been stabilized with "shotcrete".

III. SAMPLING ACTIVITIES AND PROCEDURES

The FIT members arrived onsite at 8:30 a.m. and met with Mr. Orville Janke. Sampling was conducted first on the Dolores River and second on Silver Creek. Observations were recorded and modifications to the Sampling Plan included:

- o deletion of the two piezometer samples for ground water due to their lack of depth and insufficient yield of sample.

- o deletion of the second blank due to the reduction in the total number of samples.

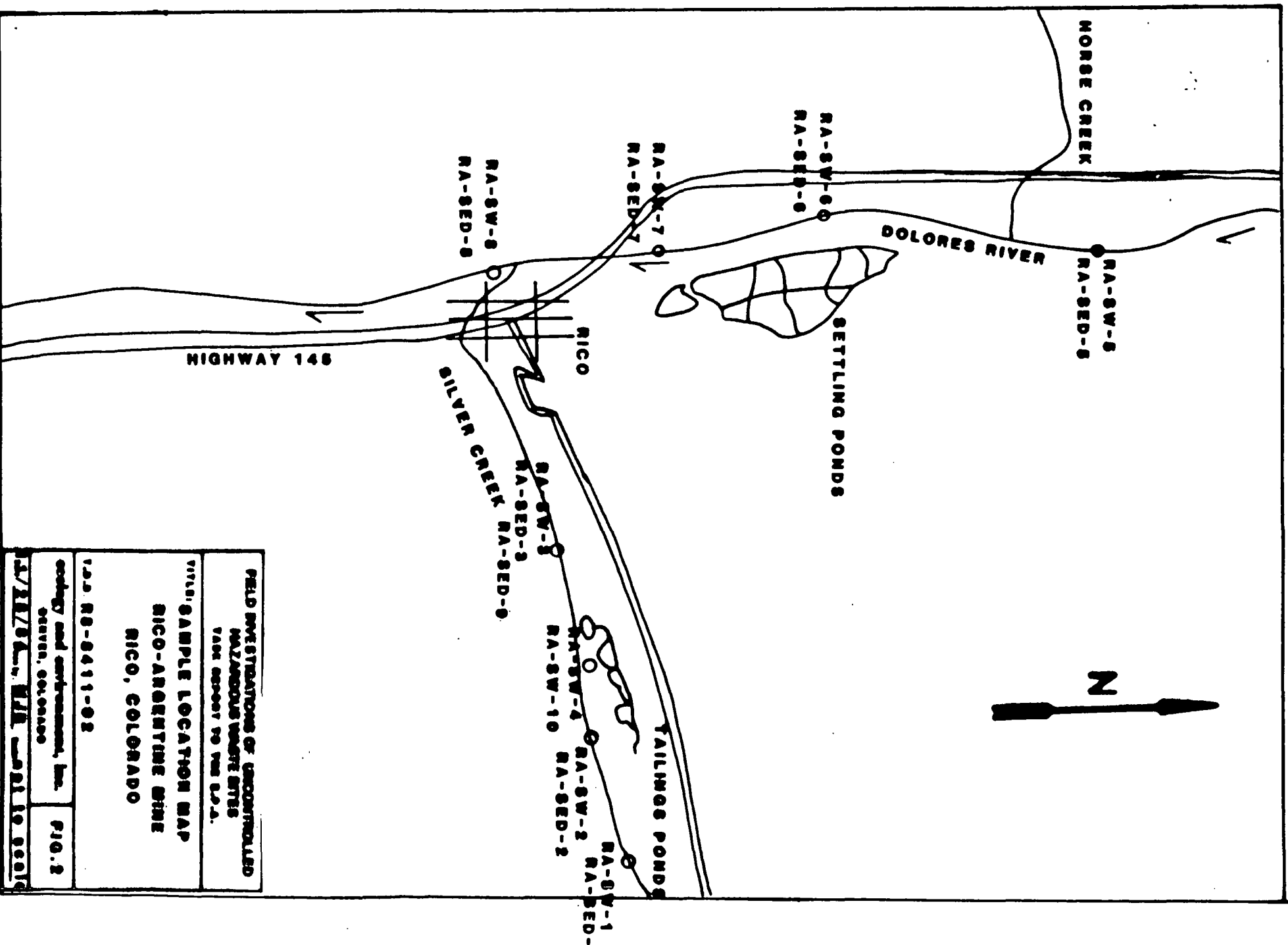
All samples were considered low hazard due to the previous site visit in October, 1984.

A. SAMPLE COLLECTION

Sampling locations are shown in Figure 2, and pertinent field data are recorded in Tables 1 through 4. Referenced photographs appear in Appendix A.

1. Surface Water

Four surface water samples were collected from the Dolores River, and five surface water samples were collected from Silver Creek. On the Dolores River surface water (RA-SW-5) was collected upstream of the Rico-Argentine mining activity (Photo 1) to establish background conditions. A second surface water sample (RA-SW-8) was taken in an area of apparent tailings pond seepage (Photo 2). A third surface water sample (RA-SW-7) was taken downgradient of discharge 002



(Photo 3). A fourth surface water sample (RA-SW-8) was taken downgradient of the confluence with Silver Creek (Photo 4). On Silver Creek surface water (RA-SW-1) was collected upstream of the major Rico-Argentine mining activity at the location of Rico's drinking water, (Photo 5). A second surface water sample (RA-SW-2) was taken downgradient of seepage from the inactive Blaine Tunnel (Photo 6). The third and fourth surface water samples (RA-SW-4 and duplicate RA-SW-10) were taken from the seepage below tailings ponds (Photo 7 and 8). The fifth surface water sample (RA-SW-3) was taken below the third tailings pond (Photo 9).

Surface water samples for total dissolved metals were filtered through a 0.45um filter using a barrel filter and compressed air. Surface water field data are provided in Table 1.

2. Sediment

Sediment samples were collected from both the Dolores River and Silver Creek. The locations for the sediment samples were the same as the surface water samples. However, no sediment sample was taken at the location of the seep below the Silver Creek tailings ponds. The field data for sediment samples are presented in Table 2.

B. QUALITY CONTROL

FIT quality control procedures as discussed in the Sampling Plan (TDD R8-8408-17) were followed closely throughout this investigation. These QA procedures are briefly summarized below.

1. Background Samples

Two background surface water samples were taken at the Rico-Argentine Mine. One background surface water sample (RA-SW-1) was taken upstream on Silver Creek at the site of Rico's town drinking water supply. A second background surface water sample (RA-SW-5) was taken upstream on the Dolores River approximately a half mile north of the confluence with Horse Creek.

Two background sediment samples were taken at the Rico-Argentine Mine. Both background sediment samples were taken at the same locations as the background surface water samples.

2. Blank and Spike Samples

A single blank water sample, RA-SW-9, was prepared for the sampling activity. Baker-Instra Analyzed water was used for metals-free water. The water was poured directly into the polyethylene bottles because surface water samples were also collected directly from the streams into the bottles. The blank sample for total dissolved metals was filtered through a 0.45 micron membrane filter using a barrel filter and compressed air. The blank sample was preserved in accordance with the technique used for trace metals.

3. Duplicate Sample

In accordance with the Sampling Plan, one duplicate surface water sample, RA-SW-10, and one duplicate sediment sample, RA-SED-9, were taken.

4. Sample Container and Preservation

Sample bottles used throughout this investigation were obtained through the Sample Management's Bottle Repository program. Bottle lot numbers were recorded in the field notebook. Sample preservation was performed in accordance with EPA recommended methods. Preservation methods are summarized in Table 4.

5. Equipment Decontamination

No equipment was contaminated during the sampling activity due to collecting the water samples directly into the bottle. Sediment samples were collected with disposable scoops.

6. Instrument Calibration

The pH and conductivity meter were calibrated prior to performing any field measurements. The pH meter was calibrated with two buffer solutions which bracketed the anticipated sample pH. Calibration of the conductivity meter was checked by measurement of a standard solution similar in conductivity to the anticipated sample conductivity. All calibrations were in accordance with the manufacturer's and the EPA's recommended procedures.

C. SAMPLE DOCUMENTATION

EPA chain of custody procedures were strictly adhered to at all times during the field investigation. Table 3 contains all chain of custody information including sample tag and chain of custody numbers.

IV. FIELD OBSERVATIONS

A. SILVER CREEK

- o The seepage that was apparent below the third tailings pond appeared to the FIT to originate from the pond. Although Dames and Moore believed this seepage to be down valley flow, the FIT observed an obvious gully originating from the pond's base.

- o The Blaine Tunnel, which is not permitted for discharge, was observed to be discharging into Silver Creek. The discharge appeared heavier in the October, 1984 site visit but was still flowing moderately during the sampling activity.

V. PROBLEMS

- o Ground water (mentioned in Sampling Activities) was not sampled because site piezometer were not deep enough to be useful.

TABLE 1. SURFACE WATER FIELD DATA SITE RICO-ARGENTINE MINE

SAMPLE ID	SAMPLING		FIELD DATA			SHIPPING DATE	COMMENTS
	DATE	TIME	PH	CONDUCTIVITY (umho/cm)	TEMPERATURE (°C)		
RA-SW-1	11-14-84	12:00pm	6.60	240	1°	11-19-84	Upstream on Silver Creek
RA-SW-2	11-14-84	12:20pm	6.88	200	1°	11-19-84	Downstream from Blaine Tunnel
RA-SW-3	11-14-84	1:10pm	7.30	290	2°	11-19-84	Downstream from tailings pond
RA-SW-4	11-14-84	12:45pm	6.25	1200	2°	11-19-84	Tailings seep
RA-SW-5	11-14-84	8:50am	6.88	200	0°	11-19-84	Upstream on Dolores River
RA-SW-6	11-14-84	9:50am	6.77	200	1°	11-19-84	Adjacent to Dolores settling ponds
RA-SW-7	11-14-84	10:20am	6.86	570	1°	11-19-84	Downstream of discharge 002
RA-SW-8	11-14-84	10:45am	6.74	400	0°	11-19-84	Downstream of Silver Creek
RA-SW-9	11-14-84	3:00pm	—	—	—	11-19-84	Blank
RA-SW-10	11-14-84	12:45pm	6.26	1200	3°	11-19-84	Duplicate of SW-4

TABLE 2. SOIL AND SEDIMENT FIELD DATA SITE RICO-ARGENTINE MINE

SAMPLE ID	SAMPLING		SHIPPING DATE	COMMENTS
	DATE	TIME		
RA-SED-1	11-14-84	12:00pm	11-19-84	Upstream on Silver Creek
RA-SED-2	11-14-84	12:20pm	11-19-84	Downstream from Blaine Tunnel
RA-SED-3	11-14-84	1:10pm	11-19-84	Downstream from Tailings Pond
RA-SED-5	11-14-84	8:50am	11-19-84	Upstream on Dolores River
RA-SED-6	11-14-84	9:50am	11-19-84	Adjacent to Dolores River settling ponds
RA-SED-7	11-14-84	10:20am	11-19-84	Downstream of Discharge 002
RA-SED-8	11-14-84	10:45am	11-19-84	DOWNSTREAM OF SILVER CREEK
RA-SED-9	11-14-84	1:10pm	11-19-84	Duplicate of SED-3

TABLE 3. **SITE** RICO-ARGENTINE MINE

TABLE 3. SITE RICO-ARGENTINE MINE						ORGANIC			INORGANIC		
SAMPLE ID	CYANIDE	SULFATE	DISSOLVED METALS	TOTAL METALS	HAZARD LEVEL E N H	TRAFFIC REPORT	TAGS	GRADE OF CUSTODY	TRAFFIC REPORT	TAGS	GRADE OF CUSTODY
RA-SW-4	X				E				MH 0709	B-15194	B-1576
		X			E				MH 0709	B-15195	B-1576
			X		E				MH 0709	B-15192	B-1576
				X	E				MH 0709	B-15193	B-1576
RA-SW-5	X				E				MH 0710	B-15198	B-1576
		X			E				MH 0710	B-15199	B-1576
			X		E				MH 0710	B-15196	B-1576
				X	E				MH 0710	B-15197	B-1576
RA-SW-6	X				E				MH 0711	B-15202	B-1576
		X			E				MH 0711	B-15203	B-1576
			X		E				MH 0711	B-15200	B-1576
				X	E				MH 0711	B-15201	B-1576

TABLE 4
PRESERVATION METHODS

MEDIA	PARAMETER	BOTTLE TYPE	PRESERVATION
Water	Cyanide	1 liter poly	6N NaOH to pH 12 Cool to 4°C
Water	Sulfate	1 liter poly	Cool to 4°C
Water	Dissolved Metals	1 liter poly	1:1HNO ₃ to pH 2 Filter through 0.45 um Cool to 4°C
Water	Total Metals	1 liter poly	1:1HNO ₃ to pH 2 Cool to 4°C
Sediment	Total Metals	8 oz. wide mouth	Cool to 4°C
Tailings	Total Metals	8 oz. wide mouth	Cool to 4°C

APPENDIX A



PHOTO 1: LOCATION OF UPGRADIENT SURFACE WATER SAMPLE, RA-SW-5, ON THE DOLORES RIVER. VIEW IS TO THE SOUTH. HORSE CREEK IS APPROXIMATELY $\frac{1}{2}$ MILE TO THE SOUTH.



PHOTO 2: LOCATION OF SURFACE WATER SAMPLE RA-SW-6 ON THE DOLORES RIVER ADJACENT TO SETTLING PONDS ON THE RIGHT. NOTE STAINING ON ROCKS BELOW PONDS. VIEW IS TO THE NORTH.



PHOTO 3: (ABOVE) LOCATION OF
SURFACE WATER SAMPLE
RA-SW-7 DOWNSTREAM
OF THE CONFLUENCE
WITH DISCHARGE POINT
002 ON THE DOLORES
RIVER.



PHOTO 4: (RIGHT) LOCATION OF
SURFACE WATER SAMPLE
RA-SW-8 DOWNSTREAM
OF THE CONFLUENCE
WITH SILVER CREEK ON
THE DOLORES RIVER.



PHOTO 5: (ABOVE) LOCATION OF
UPSTREAM SURFACE WATER
SAMPLE RA-SW-1 ON SILVER
CREEK. GREEN BUILDING
IN BACKGROUND NOTES
LOCATION OF TOWN WATER
SUPPLY.

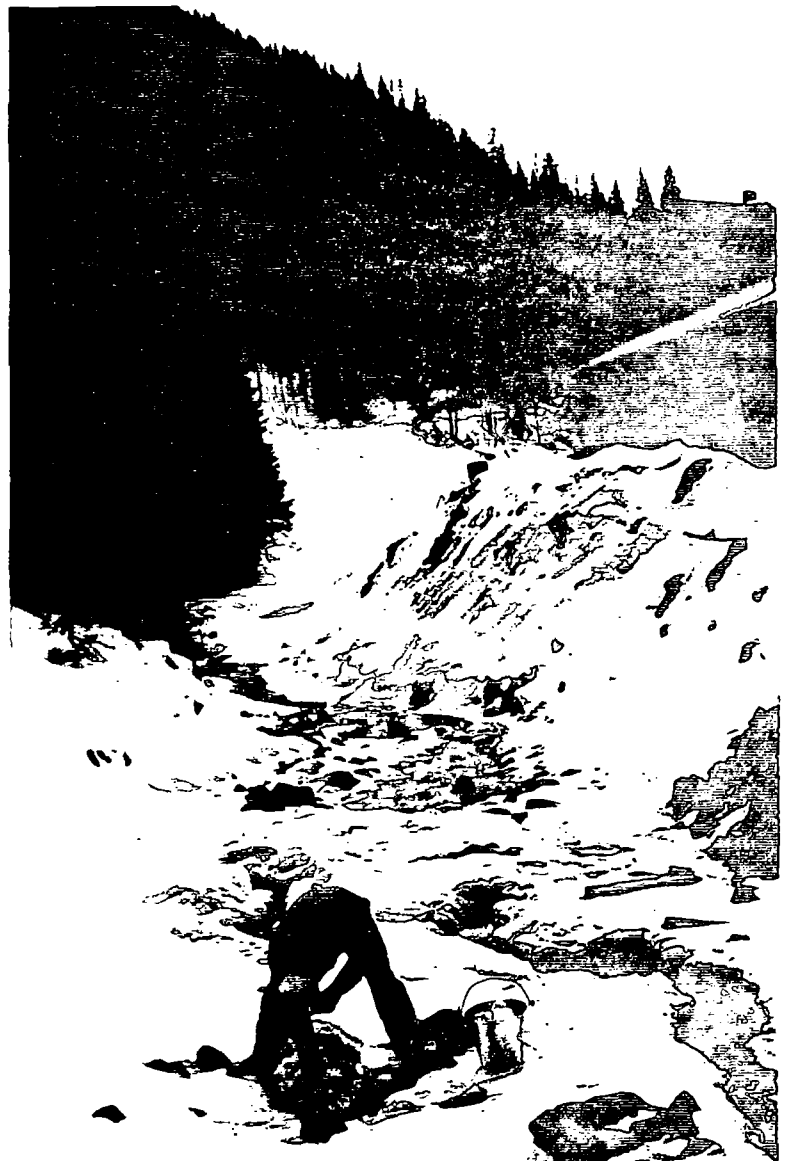


PHOTO 6: (RIGHT) LOCATION OF
SURFACE WATER SAMPLE
RA-SW-2 TAKEN DOWN-
STREAM OF BLAINE
TUNNEL DISCHARGE ON
SILVER CREEK.

PHOTO 7: (RIGHT) LOCATION OF
TAILINGS POND SEEP
SAMPLES RA-SW-4 AND
RA-SW-10. THE THIRD
TAILINGS POND IS IN
THE BACKGROUND. NOTE
GULLY TO TAILINGS
POND.



PHOTO 8: (BELOW) LOCATION OF
SURFACE WATER SEEP
SAMPLES RA-SW-4 AND
RA-SW-10 SHOWING
CLOSE-UP OF IRON
STAINING.





PHOTO 9: LOCATION OF SURFACE WATER SAMPLE RA-SW-3
TAKEN DOWNSTREAM OF TAILINGS PONDS ON
SILVER CREEK.